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(56) Documents Cited

GB 2131621 A GB 0955457 A EP 0479650 A1
EP 0104787 A1 US 5364252 A

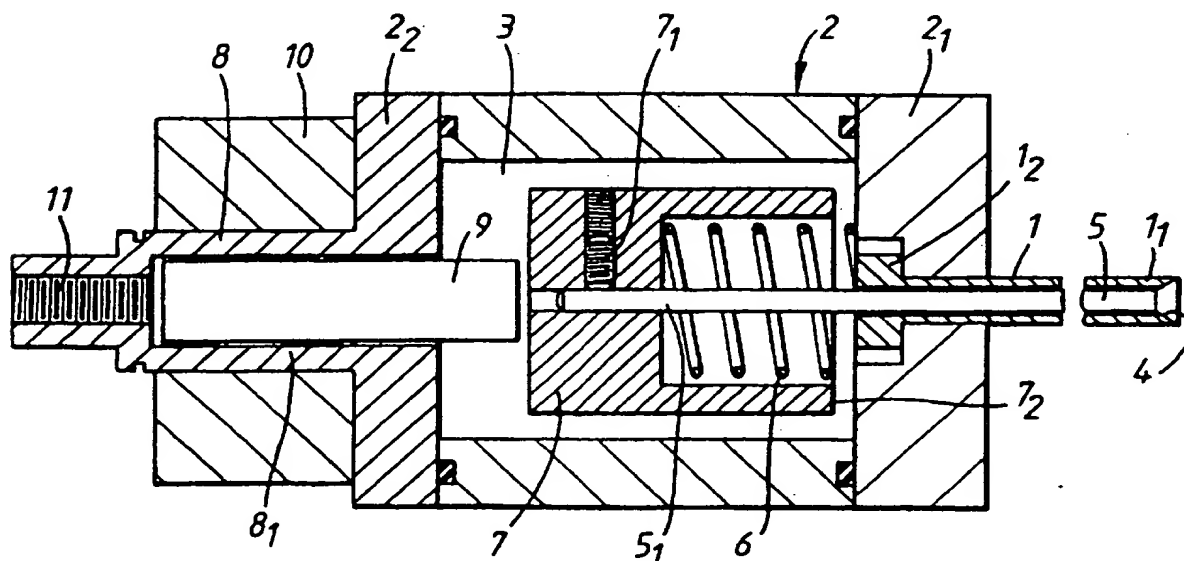
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(54) GAS INJECTOR FOR THE MOULDING OF PLASTIC HOLLOW PARTS

(57) A gas injector comprising a tube (1) connected with a source of pressurized gas and designed to open out at its end into the cavity of a plastic material injection mould to effect the swelling of this plastic material and to produce a hollow part, said injector being characterized in that the tube (1) forms, at this end (1₁), the seat of a sealing valve (4), said valve extending inside the tube by a rod (5) placed under the action of a spring (6) effecting the closure of this valve, said rod being also placed under the action of a motor means provided with a control means to effect the opening of the valve against the spring. The tube 1 extends into a hollow enclosure 3 into which extends the rod 5 too.

The motor comprises an electromagnet with a solenoid 9 disposed in the enclosure and with the coils 10 disposed outside thereof.



GB 2 298 610 A

Technical drawing of a mechanical assembly in cross-section. The main assembly consists of a central component 1 with internal features 5, 6, 7, 8, 9, 10, and 11. External features 12 are also shown. A detail view 4 shows a component 5 with a feature 7.

GAS INJECTOR FOR THE MOULDING OF
PLASTIC HOLLOW PARTS

The invention relates to a gas injector for the moulding of plastic hollow parts, as well as to the injection moulds fitted with said injector.

The injector of the invention includes a tube connected with a source of pressurized gas, and designed to open out at its end into the cavity of an injection mould of plastic material to provide for the swelling of this plastic material and the making of a hollow part, characterized in that the tube forms, at that end, the seat of a sealing valve, said valve extending inside the tube by a spring-actuated rod effecting the closure of said valve, this rod being also subject to the action of a motor means equipped with a control means to bring about the opening of the valve against the spring.

According to another characteristic of the invention, the tube opens out, at the other end, into a hollow enclosure of an injector body connected to the source of pressurized gas, while the rod also extends into this enclosure where it is situated under the action of the spring and of the motor means.

According to another characteristic of the invention, the spring is mounted in the cavity to surround the rod and bears, on the one hand, against a cup integral with the rod, and, on the other hand, against an end of the cavity, the motor means being constituted by an electro-magnet with solenoid plunger mounted at the other end of the cavity to act axially on the rod.

The invention is illustrated for the sake of example non-limitatively on the sole figure attached, which is an axial section of a method of implementation of the gas injector.

Accordingly, the present invention has for its object the production of a gas injector of reliable operation, and particularly without the danger of becoming clogged with plastics material flowing back into the injection tube, which would, in each case, require the moulding machine to be stopped, and thus cause a loss of productivity associated with the time spent on taking down, cleaning and replacing the injectors.

This correct operation of the injectors without clogging, even only partly, results also in a better quality of the moulded parts and constancy of this quality, thus substantially reducing the number of parts with defects,

having to be scrapped.

This results from the fact that the injector of the invention makes it possible to bring into the cavity of the mould, within a specific period, a volume of gas that is constant from one operation to the next, so as to obtain, in the parts, a hollow part of specific volume and shape repeated from one part to the next, without this plastic part presenting locally wall areas of a thickness that is abnormally too small or too great. This, indeed, would create on the part, areas of too rapid cooling or too slow cooling, resulting, at the very least, in appearance faults on the moulded part.

The injector of the invention is composed of a tube 1, the free end 1_1 of which plunges into the inside of the cavity of a mould for the injection moulding of a hollow plastic part. This tube is fixed at its other end 1_2 in the end flange 2_1 of a cylindrical body 2 defining a cavity 3 which thus communicates with the inside of the tube 1.

The end 1_1 of the tube 1 is made in the shape of a conical valve seat upon which the sealing valve 4 applies. This valve 4 is integral with a rod 5, the diameter of which is smaller than the inner diameter of

the tube 1 so as to allow the flowing of the pressurized gas intended to effect the inflation of the plastic material injected from another direction into the cavity of the mould.

The sealing of the tube 1 by the application of the valve 4 against this seat 1_1 , is obtained by means of a coil spring 6 situated around the end 5_1 of the rod 5 which extends inside the cavity 3. This spring 6 is thus compressed between the end flange 2_1 of the body 2 and a cylindrical cup 7 fixed on the end 7_1 of the rod 5 by a needle screw 7_1 . This cup provides for the centring of the spring, and by its edge 7_2 it determines the maximum height of olift of the valve 4.

The end flange 2_1 of the body 2 is fitted with a hollow sleeve 8, protruding axially, the cylindrical housing 8_1 of which accommodates with a clearance, and with free sliding, the solenoid plunger 9 of an electromagnet, the coil 10 of which is arranged around the sleeve 8. The supply to the coil 10 of the electromagnet causes the solenoid plunger 9 to move towards the cup 7 against which it then applies to effect the opening of the valve 4 against the spring 6.

The control of the opening or the closing of the sealing

valve may therefore be set at very precise times within the moulding cycle, culminating also in a better quality of the moulded hollow parts obtained.

The pressurized gas injected into the cavity of the mould to effect the swelling of the plastic material and its application against the wall of the mould, is introduced into the mould by means of the cavity 3 and of the housing 8₁ the end of which is provided with an axial hole 11 connected to the source of pressurized gas.

Thus, in this construction, the pressurized gas flows through the annular space left free in the housing 8₁ by the solenoid plunger 9.

CLAIMS

1. A gas injector for the moulding of hollow parts in plastic material, comprising a tube designed to open out into the cavity of an injection mould at one of its ends fitted with a sealing valve extending inside the tube by means of a rod, while the other end of said tube opens out into a hollow enclosure into which there extends the rod mounted in this cavity, further to the action of a valve closing spring, an electromagnet being also provided to effect the opening of the valve against the spring, the arrangement being characterized in that the electromagnet is an electromagnet with solenoid plunger, the solenoid of which is wholly disposed in the cavity, whereas its coil is situated outside the cavity.

2. An injector in accordance with claim 1, characterized in that the solenoid plunger of the electromagnet is entirely placed, with a clearance, in a housing at the end of the cavity, this housing also constituting a duct for the flow of pressurized gas into the tube through the cavity.

3. A gas injector substantially as described with reference to the drawings.

(0809H)



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Claims searched: 1-3

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Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK CI (Ed.O): B5A (AD28, AT14G, AT14V, AT15F); F2V (VS20, VX3)
Int CI (Ed.6): B29C 45/17 49/15 49/60; F16K 31/02 31/06
Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	GB 2131621 A (THE CESSNA...) see the rod-like sealing valve 36, tube 32, armature 16 all in one cavity	1,2
Y	GB 0955457 (SAURER) see tube 2, piston seal 16, rod 19 all extending inside a cavity that accommodates solenoid 20 with coils 15 outside	1,2
A	EP 0479650 A1 (HYDRIS) see figure 1	1
Y	EP 0104787 A1 (GREAT BATCH) see page 1 lines 1-5; tube 18, sealing valve 140 with rod 112 with armature inside one cavity and coil 74 outside thereof	1 at least
Y	US 5364252 (GENERAL MOTORS) see column 4 line 46- column 5 line 3; column 5 line 52 onwards	1 at least

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.
& Member of the same patent family

A Document indicating technological background and/or state of the art.
P Document published on or after the declared priority date but before the filing date of this invention.
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